

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. Claims 1-20 have been rejected. Claims 1 and 17 have been amended. Accordingly, Claims 1-20 remain pending in the application.

In the Specification, paragraph [0001] has been amended to provide a U.S. Patent Application Serial Number and filing date and to remove an attorney docket number for a related patent application.

No new matter has been added.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

Claim Rejections – 35 U.S.C. § 102(b)

On page 2 of the Office Action, Claims 17-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,998,807 to Lustig et al. Applicants respectfully traverse this rejection.

Independent Claim 17 (as amended) recites, among other limitations, “selectively providing spacers for the first set of gate structures.”

Lustig et al. does not disclose selectively providing spacers for a first set of gate structures. In contrast, Lustig et al. states “Spacers 140 . . . are formed in the region of the sidewalls of the gate electrodes 11 . . .” (see column 4, lines 66-67 and Figure 3). Thus, Lustig et al. does not disclose providing a spacer to a first set of gate structures while not providing the spacer to a second set of gate structures, as recited in Claim 17 (as amended).

The rejection of Claims 17-20 should be withdrawn, because at least one limitation of independent Claim 17 (and corresponding dependent Claims 18-20) is not identically

disclosed by Lustig et al. Accordingly, the Applicants request reconsideration and withdrawal of the rejection of Claims 17-20 under 35 U.S.C. § 102(b).

Claim Rejections – 35 U.S.C. § 103(a)

1. Claims 11 and 14-16

On page 3 of the Office Action, Claims 11 and 14-16 were rejected as being unpatentable over U.S. Patent No. 5,141,890 to Haken in view of U.S. Patent No. 6,649,492 to Chu et al. under 35 U.S.C. § 103(a). Applicants respectfully traverse this rejection.

Independent Claim 11 recites, among other limitations (with emphasis added), “selectively providing offset spacers for a second group of the field effect transistors, the second group of the field effect transistors being different than the first group of the field effect transistors, wherein the first group and the second group are provided on a top surface of a strained semiconductor layer.”

As noted in the Office Action, Haken does not teach or suggest the use of a “strained semiconductor layer” as recited in Claim 11. Nevertheless, the Examiner stated:

Chu teaches that applying conventional CMOS process flows to strained silicon base layers was known to enhance the transport for both holes and electrons (col. 4, ll. 49-57). Chu further notes that the advantages of the strained silicon layer will accrue to many technologies (col. 10, ll. 4-15). Thus, there is no reason to believe that the transport properties of the device of Haken would not benefit from being formed on a strained silicon layer as well.

A person of ordinary skill in the art would have reasonably expected that incorporating a strained silicon base layer into the device of Haken would lead to an improvement in transport for both holes and electrons. Thus, the claimed invention would have been prima facie obvious to a person having ordinary skill in the art at the time of the invention.

To establish a prima facie case of obviousness based on a combination of prior art references under 35 U.S.C. § 103(a), the Examiner must first show that there is a suggestion or motivation to combine the teachings of those references. This may come in the form of

some objective teaching in the prior art or, alternatively, knowledge generally available to one of ordinary skill in the art at the time of the invention that would lead that individual to combine the relevant teachings of the references. The Applicants submit that the Examiner has not satisfied the initial burden of showing that one of ordinary skill in the art would have been motivated to combine the teachings of Haken with those of Chu et al.

As shown above, in rejecting Claims 11 and 14-16, the Examiner noted that “there is no reason to believe that the transport properties of the device of Haken would not benefit from being formed on a strained silicon layer as well.” The Applicants note that this statement is not equivalent to a finding that one of ordinary skill in the art would have been motivated to make the combination; instead, this statement seems to suggest that one of skill in the art would not have been persuaded not to make the combination. These are very different statements, and the latter cannot support a finding that one of ordinary skill in the art would have been motivated to make the asserted combination.

Further, the Applicants note that the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. See, e.g., M.P.E.P. § 2143.01 (quoting In re Mills, 916 F.2d 680, 16 USPQ.2d 1430 (Fed. Cir. 1990)). Using what is taught by the present application as a roadmap to combine otherwise unrelated references constitutes improper hindsight reasoning, and cannot provide a proper motivation to combine the teachings of the cited references.

There is no teaching or suggestion in either Haken or Chu et al. to make the combination asserted in the Office Action. The only teaching to make such a combination comes from the Applicants’ own disclosure. The method recited in Claim 11 provides solutions to difficulties that were not recognized by either Haken or Chu et al. For example, as described in the present Specification at paragraphs [0010]-[0011]:

[0010] Heretofore, forming source and drain extensions on strained semiconductor layers has been difficult using conventional double implant processes. For example, compensation is required for N-type dopants to reduce enhanced lateral diffusion under the edge of the gate. Enhanced

lateral diffusion causes overlap of source and drain extensions in the channel, thereby resulting in short channel effects.

[0011] Low annealing temperatures and low thermal budgets are often utilized to reduce short channel effects. However, low annealing temperatures and low thermal budgets can cause suppressed diffusion of P-type dopants in strained silicon. Suppressed boron diffusion can prevent sufficient overlap of the gate and the source and drain regions, thereby resulting in lower drive currents ($I_{d(sat)}$).

It is clear that Haken does not recognize the difficulties associated with strained semiconductor materials, since as described above, Haken does not teach or suggest the use of such materials. Further, there does not appear to be any recognition in Chu et al. of these difficulties. The Applicants have invented a method that provides a solution to a problem that is not even recognized by either of the cited references. The mere fact that Chu et al. states that “electronic systems that can take advantage of the high performance devices fabricated in the Si based strained layer are many” (column 10, lines 4-6) does not provide evidence that one of ordinary skill in the art would have been motivated to combine the teachings of Chu et al. with any other reference using such electronic systems, without further teaching to do so.

The method recited in independent Claim 11, considered as a whole, would not have been obvious in view of Haken and Chu et al. Accordingly, the Applicants respectfully request withdrawal of the rejection of independent Claim 11 and dependent Claims 14-16 under 35 U.S.C. § 103(a).

2. Claims 1, 7, 8, 9, and 10

On page 4 of the Office Action the Examiner rejected Claims 1, 7, 8, 9, and 10 as being unpatentable over U.S. Patent No. 5,654,212 to Jang in view of Chu et al. under 35 U.S.C. § 103(a). Applicants respectfully traverse this rejection.

For similar reasons to those described in the preceding section, the Applicants submit that the Examiner has not established that one of ordinary skill in the art would have been motivated to combine the teachings of Jang with those of Chu et al. That is, the Applicants submit that one of ordinary skill in the art would not have been motivated to make the

combination asserted in the Office Action without further teaching to do so. Reconsideration and withdrawal of the rejection of Claims 1, 7, 8, 9, and 10 is therefore respectfully requested.

Even if such a combination were proper, however (which it is not), the combination of Jang and Chu et al. does not teach or suggest at least one element of independent Claim 1.

For example, Claim 1 (as amended) recites a method comprising, in combination with other elements, “providing a first gate structure and a second gate structure on a semiconductor substrate including a strained semiconductor layer, the first gate structure and the second gate structure each including a first spacer” and “selectively providing a second spacer to the first gate structure.”

Neither Jang nor Chu et al. teach or suggest selectively providing a second spacer to a gate structure that already includes a first spacer. In contrast, Jang shows the use of two spacers (labeled 260 and 265) on each of the gate structures. Such disclosure illustrates that Jang does not appear to appreciate the problem being solved by the method recited in Claim 1. As noted in the present application (see, e.g., paragraph [0054]), one advantageous feature of the use of such second spacers is that they provide sufficient distance to prevent adverse effects of enhanced lateral diffusion associated with dopants.

The method recited in independent Claim 1, considered as a whole, would not have been obvious in view of Jang and Chu et al. Accordingly, the Applicants respectfully request withdrawal of the rejection of independent Claim 1 and dependent Claims 7, 8, 9, and 10 under 35 U.S.C. § 103(a).

3. Claims 2-3

On page 6 of the Office Action, Claims 2-3 were rejected as being unpatentable over Jang in view of Chu et al. and further in view of U.S. Patent No. 6,689,671 to Yu under 35 U.S.C. § 103(a). Applicants respectfully traverse this rejection.

The Applicants submit that Yu is unavailable as a prior art reference for the present application. Yu is assigned to Advanced Micro Devices, Inc. of Sunnyvale, CA, as indicated on the face of Yu. The present application is also assigned to Advanced Micro Devices, Inc.

of Sunnyvale, CA, as shown in an assignment document recorded with the U.S. Patent and Trademark Office on July 15, 2003 at Reel/Frame No. 014290/0737.

Yu issued on February 10, 2004 based on an application filed on May 22, 2002. The present application was filed on July 15, 2003. Accordingly, Yu would be available as prior art only under 35 U.S.C. § 102(e). However, because Yu and the present application were owned or subject to an obligation of assignment to the same entity at the time of the invention, Yu is unavailable as prior art for the present application pursuant to 35 U.S.C. § 103(c), which states as follows:

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

The Applicants respectfully request withdrawal of the rejection of Claims 2-3 under 35 U.S.C. § 103(a).

4. Claims 4-5

On page 7 of the Office Action, Claims 4-5 were rejected as being unpatentable over Jang, Chu et al., and Yu and further in view of U.S. Patent No. 5,624,871 to Teo under 35 U.S.C. § 103(a). Applicants respectfully traverse this rejection.

As described in the preceding section, the Applicants submit that Yu is unavailable as prior art against the claims of the present application.

Accordingly, the Applicants respectfully request withdrawal of the rejection of Claims 4-5 under 35 U.S.C. § 103(a).

5. Claim 6

On page 7 of the Office Action, Claim 6 was rejected as being unpatentable over Jang in view of Chu et al. and further in view of U.S. Patent No. 5,384,285 to Sitaram et al. under 35 U.S.C. § 103(a). Applicants respectfully traverse this rejection.

As described above, independent Claim 1 (from which Claim 6 depends) would not have been obvious over the combination of Jang and Chu et al. For example, neither Jang nor Chu et al. teach or suggest the selective formation of a second spacer to a gate structure that already includes a first spacer.

Sitaram et al. also does teach or suggest selectively forming a second spacer to a gate structure that already includes a first spacer. In contrast, Sitaram et al. shows only a single sidewall spacer 26 provided adjacent gate electrode 12, without a second spacer provided thereon. Nor is there any teaching or suggestion to selectively provide such a second spacer on selected gate structures.

The method recited in independent Claim 1, considered as a whole, would not have been obvious over Jang and Chu et al. in view of Sitaram et al. Accordingly, the Applicants respectfully request withdrawal of the rejection of dependent Claim 6 under 35 U.S.C. § 103(a).

6. Claims 12 and 13

On page 8 of the Office Action, Claim 12 was rejected as being unpatentable over Haken and Chu et al. and further in view of Sitaram et al. and Claim 13 was rejected as being unpatentable over Haken, Chu, and Sitaram and further in view of U.S. Patent No. 5,998,873 to Blair under 35 U.S.C. § 103(a). Applicants respectfully traverse these rejections.

As described above, the Applicants submit that the Examiner has not satisfied the burden of showing that one of skill in the art would have been motivated to combine the teachings of Haken with those of Chu et al. Accordingly, the Applicants respectfully request withdrawal of the rejection of Claims 12-13 under 35 U.S.C. § 103(a).

* * *

It is submitted that each outstanding objection and rejection to the Application has been overcome, and that the Application is in a condition for allowance. Claims 1-20 will be pending in this Application. The Applicants request consideration and allowance of all pending Claims 1-20.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

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By 

FOLEY & LARDNER LLP
Customer Number: 26371
Telephone: (414) 297-5564
Facsimile: (414) 297-4900

Marcus W. Sprow
Attorney for Applicants
Registration No. 48,580